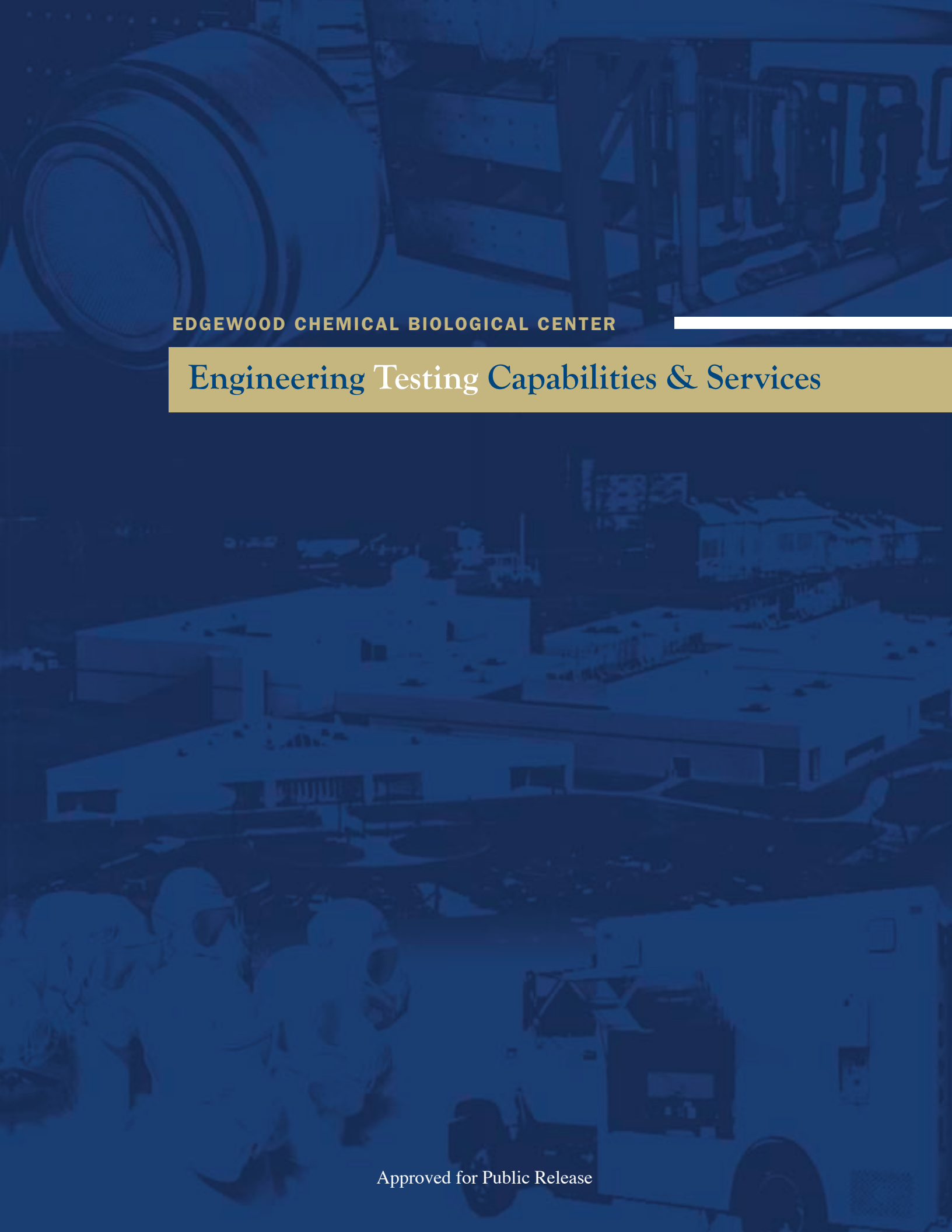


EDGEWOOD CHEMICAL BIOLOGICAL CENTER

Engineering Testing Capabilities & Services

Approved for Public Release

MESSAGE FROM THE DIRECTOR

The US Army Edgewood Chemical Biological Center's (ECBC) Engineering Test Group makes crucial contributions to the Defense Department's efforts to combat weapons of mass destruction and win the Global War on Terrorism. Chemical and biological lifecycle testing is performed at ECBC for the detection, protection and decontamination commodity areas. Execution of bench to large-scale testing for the Department of Defense (DoD), other Government agencies and private industry is possible because of our unique hands-on subject matter expertise, infrastructure, equipment and instrumentation.

This capabilities book describes key ECBC test infrastructure, which encompasses more than 10 facilities in the Edgewood Area of the Aberdeen Proving Ground and the Rock Island Arsenal in Illinois. These facilities house a wide variety of laboratories and test chambers operated by teams that are Organization for Standardization (ISO) 9000 and 17025 compliant, and are either certified or working toward certification. Our test program is operated under the terms of the ECBC Quality Assurance Policy , which ensures that best practices are consistently applied.

ECBC has a long history of discovery, innovation and responsiveness. ECBC's Engineering Test Group follows that tradition – working closely with clients and partners to design and deliver custom test programs that allow our customers to make knowledgeable decisions based on the best available test data. We describe a few of these recent accomplishments at the end of this brochure and hope you will allow us the opportunity to serve you as well.

Our success should be credited to the commitment of the cooperative efforts across the Center and our customers, in Joint Program Manager Offices, the Joint Program Executive Office for Chemical and Biological Defense, of the DoD and OGAs.

Sincerely,

Richard (Rick) W. Decker
Director, Engineering

RDECOM and ECBC are key partners in the Joint Team to fulfill responsibilities to national security. We will continue to increase the relevance and readiness of our operating an institutional forces through planning, preparation and execution of actions aimed at rapidly implementing necessary and positive change.

TABLE OF CONTENTS

Engineering Test Group

INFORMATION ABOUT THE EDGEWOOD CHEMICAL BIOLOGICAL CENTER & THE ENGINEERING TEST GROUP

ECBC is the nation's principal research, development and engineering center for non-medical chemical and biological defense. ECBC is an organizational element of the Army's Research, Development and Engineering Command, which reports to the Army Materiel Command. ECBC develops technology in the areas of detection, protection and decontamination and provides support over the entire lifecycle — from basic research through technology development, engineering design, equipment evaluation, product support, sustainment, field operations and disposal.

The Engineering Test Group performs diverse testing in support of lifecycle chemical and biological detection, protection and decontamination commodity areas from basic research through technology development and advanced development to production and sustainment. In-house hands-on expertise, unique infrastructure, equipment and instrumentation necessary to execute bench to large-scale testing of materials, components, subsystems and systems, the group supports the DoD, other federal agencies and private industry. Testing is routinely conducted challenging technology and hardware with chemical agents, toxic industrial chemicals and simulants, including large-scale testing with Biological Level 1 materials.

ENGINEERING TEST GROUP

VISION

A recognized CB Community resource for chemical agent and biological simulant lifecycle materiel testing.

MISSION

Provide chemical and biological testing services in support of the passive defense Joint Service technology and acquisition programs, and homeland security domestic agencies and the commercial sector.

CORE COMPETENCE

Expertise with chemical agent and biological simulants at all stages of the materiel lifecycle.

LOCATION

Edgewood Area, Aberdeen Proving Ground, MD

ORGANIZATION

- Engineering Test Group Leader
- Test, Reliability & Evaluation Team
- Environmental & Field Test
- Protection Factor & Hazardous Material Testing
- Applied Test Team
- Protective Equipment Team

ENGINEERING TEST GROUP

EMPLOYEES

100 engineers, scientists, technicians and specialists.

TEST INFRASTRUCTURE ASSETS

Square Footage > 200,000

Value of Physical Plant > $80,000,000

CUSTOMER BASE

Department of Defense, other Federal agencies and private sector

POINT OF CONTACT

Ronald P. Pojunas, P.E.

Engineering Test Group Leader

410-436-5596 (DSN 584-5596)

ronald.pojunas@us.army.mil

(For Team Information see page 33)

MAILING ADDRESS

Edgewood Chemical Biological Center

AMSRD-ECB-ENT

5183 Blackhawk Road

APG-EA, MD 21010 - 5424

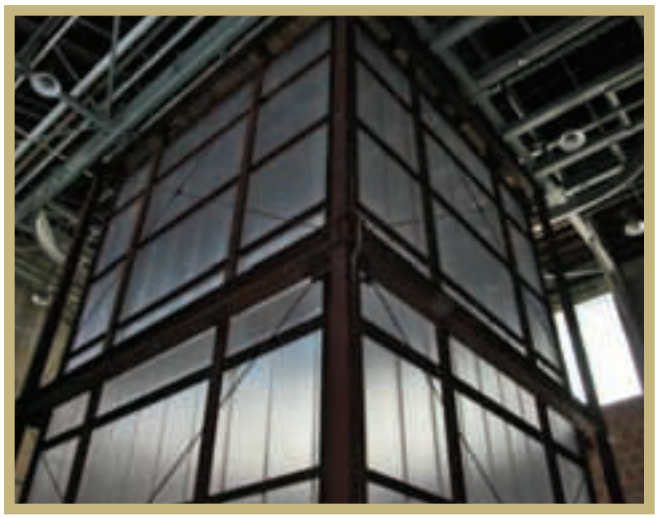
INFRASTRUCTURE

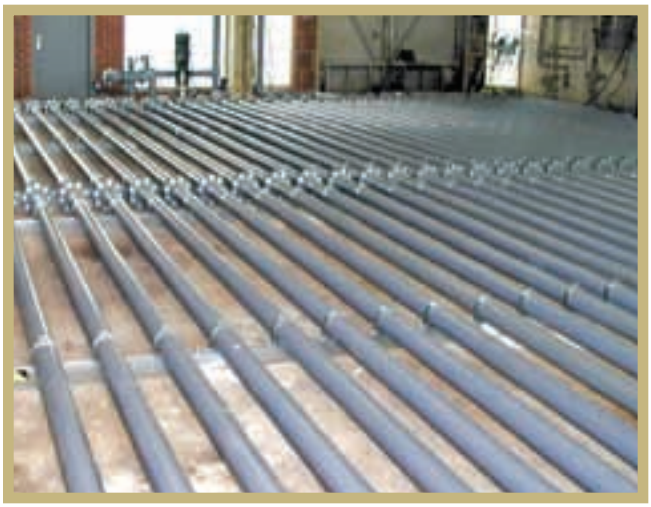
Investment in new and modernization of existing Engineering Test Group infrastructure is vital to maintaining the capability to provide diverse and technology relevant testing services. Recent investments encompass new and upgrades of current equipment, instrumentation and facilities. Infrastructure acquisition highlights consist of:

- Stand-up of a toxic industrial chemical laboratory
- Vehicle static challenge simulant enclosure
- Dust chamber containment system upgrade
- Environmental climatic chamber
- Drop tester
- Loose-cargo system
- Compression tester
- Shaker displacement tester
- Data acquisition instrumentation

A 2006 facilities assessment of our chemical agent test facilities resulted in the identification and initiation, of a broad scope of systems and building improvements including:

- Toxic filtration systems for one of our unique 16,000 cubic foot toxic and explosives chemical agent chamber.
- Laboratory upgrade from general chemistry to chemical agent testing
- Electrical, heating, ventilation and air conditioning maintenance and repairs
- General facilities maintenance and repairs





Engineering Test Group

LARGE-SCALE AGENT & EXPLOSIVE CHAMBERS

Edgewood Chemical Biological Center maintains two explosive hazardous material test facilities, which house chambers uniquely designed for total containment in the testing of chemical (military and industrial) related equipment and explosive/toxic munitions/materials. The chamber has the capability for simultaneous tests of chemical warfare agents and explosives under various climatic conditions.

Each facility is equipped with an elementary neutralization system that can process up to 10,000 gallons of hazardous waste generated from testing. The facilities are currently approved to handle 170 gallons (equivalent to one-ton container) of military-unique chemical and industrial materials. The facilities is also certified for one pound of explosives when combined with chemical material, and five pounds of explosives without chemical material.

Explosive tests reveal the blast resistance of models and components such as motors, shields and other equipment. Tests also reveal the environmental impact of fuels and plastics should they explode, as well as the physical behavior of materials when they interact with and penetrate other objects. The on-site surety laboratory is equipped to handle all sample analysis generated from the testing. Personnel experience includes handling military-unique chemicals, military munitions, hazardous industrial chemicals and hazardous waste.

FEATURES

CAPABILITIES

- Two cylindrical 16,000 cubic foot chambers (32 ft diameter, 20 ft high)
- Total explosive and vapor containment
- Withstands up to one pound of explosives with chemical agent, five pounds without chemical agent
- Flexible for multiple types of sampling and control systems
- Personnel trained in chemical agent handling, explosives and hazardous waste

EQUIPMENT

- 5000 cubic feet per minute filtration system
- MINCAMS ®
- 10,000 gallon storage capacity for hazardous waste
- Digital video recording

LARGE-SCALE SIMULANT CHAMBER

The team designed and built a large-scale aerosol and vapor chamber and supporting systems to meet diverse testing requirements. The flexibility of the chamber design accomodates modification to accept various generation, dissemination and sampling systems, and to optimize the test volume within any desired range up to 14,800 cubic feet.

Chamber exhaust-air filtration provides a high efficiency particulate and gas 3,000 cubic feet per minute (cfm) system controlled by a variable frequency drive. Ten mixing fans and a plenum system act as a simulant aerosol mixing box or baffle. Liquid decontamination waste is collected through a sump and piping system in a 2,500 gallon polyethylene holding tank. Multiple concentration and particle size measuring devices can be employed in accordance with the challenge specifications. Chamber conditions can be monitored in real-time to include temperature, humidity, air-flow and pressure. The aerosol chamber operates at ambient temperatures and humidity.

Features such as a large facility access door, operations control room, the availability of hydraulic scissor lift and adequate working space surrounding the chamber provide for ease of operations and necessary infrastructure alterations.

FEATURES

CAPABILITIES

- Chemical/Biological Agent Simulant Aerosol Testing
- Dimethymethylphosphonate/ Bacillus globigii
- Aerosol Countermeasure Testing
- Secondary Containment

EQUIPMENT

- 14,800 cubic-foot chamber (20' x 20' x 37' tall)
- 3,000 cfm filtration system
- Sampling system for profile of entire chamber
- Turbulent mixing fans
- 2,500 gallon holding tank and sump
- Entire wash down capable with bleach and/or water
- Control system regulates pressure within the chamber
- High output simulant aerosol generation system

LARGE-SCALE WATER TEST LOOP SYSTEM

The Water Test Loop System (WTLS) at Edgewood Chemical Biological Center (ECBC) is the result of a partnership with two Federal organizations: the US Environmental Protection Agency National Homeland Security Research Center and the Army Corps of Engineers, Construction Engineering Research Laboratory. Concerned with water safety for civilians and military populations, they have been working to develop models and sensors to predict the behavior and detection of chemical and biological agents in various water systems.

The WTLS consists of a large (approximately 1,300 gallons) and a small (approximately 250 gallons) re-circulating chlorinated polyvinyl chloride pipe loop with sample sensor and injection ports. The large WTLS was designed for experiments using non-hazardous or simulant compounds. The small WTLS was designed to conduct experiments with chemical warfare agents, toxic industrial chemicals, and toxins.

The water loop's intricate conduit is intended to mimic the dynamics of a home or business water utility delivery system. One portion of the loop network is comprised of over 2,000 feet of piping. The entire loop network is constructed to allow for the replacement of individual or modular sections of pipe. This allows pipes of various material and age to be inserted into the test loop during studies. This, coupled with the system's ability to manipulate residence timing, lends itself to replicating a wide variety of water transport scenarios.

FEATURES

CAPABILITIES

- Test live biological/chemical agents in a simulated public water system
- Real-time monitoring of water quality parameters

EQUIPMENT

- Large Loop: 1,300 gallons
- Small Loop: 250 gallons
- Commercially available water sensors
- Analytical lab for results analysis

FIELD TESTING

Edgewood Chemical Biological Center's (ECBC) Environmental and Field Test Facilities are located on a 400-acre plot of land used as a research and development test range for outdoor testing of various military and commercial products in a safe and environmentally friendly manner. ECBC's experienced personnel develop specialized test setups to manipulate test items while minimizing personnel's exposure to hostile test environments, using Agilent VEE Pro Graphical Instrumentation Programmer and Data Acquisition Program to capture data, and video cameras to document tests. The "L"-shaped vertical grid provides a three-dimensional reference for visual observations and video documentation of munition detonations including burst heights and cloud characterizations. Engineering and investigative tests have included explosive operations, dissemination of different smoke materials, interferent trials for development of chemical and biological detectors, operation of unmanned aerial vehicles, and non-lethal equipment and smoke rounds used by law enforcement personnel.

FEATURES

CAPABILITIES

- Perform interferent tests
- Perform operational tests of explosives, munitions, and visual & infrared generation systems
- Videotape and still photos of tests

EQUIPMENT

- 400 acre test area
- 300' x 300' concrete staging pad
- Observation bunker
- "L"-shaped vertical firing grid with 1 meter survey points - sides are 20 meters long & 15 meters high
- Weather station
- HP & Fluke Data Acquisition Systems

REQUIREMENTS

- American Society for Testing of Materials Test Standards
- Military, Federal and Commercial Test Standards

Engineering Test Group

CLIMATIC & HARSH ENVIRONMENT TESTING

Edgewood Chemical Biological Center's (ECBC) Environmental and Field Testing Facilities can determine how products and materials perform under extreme environmental conditions. ECBC personnel can simulate any environmental stress condition that today's warfighter would experience using the laboratory test methods in accordance with the Military Standard 810F Test Standards. Methods include low pressure (altitude), high and low temperatures, temperature shock, solar radiation, rain, icing/freezing rain, humidity, salt fog (corrosion), sand and dust, and immersion. Various conditions include temperatures from -80°F to 350°F, humidities from 2% to 98%, blowing rain up to 6 inches of rain per hour with wind speeds up to 45 miles per hour, blowing sand at air velocities of 18 to 29 meters/second (3540 to 5700 feet/minute, 40.2 to 64.7 miles/hour), blowing dust at air velocities of 1.5 to 8.9 meters/second (300 to 1750 feet/minute, 3.4 to 19.9 miles/hour), low pressure altitudes to 30,480 meters (100,000 feet) and rapid decompression within 15 seconds. Personnel can perform on-line data acquisition and analysis of tested components using Agilent VEE Pro© Graphical Instrumentation Programmer and Data Acquisition Program. Products can be manipulated to operate while exposed to a threat representative test environment. Instrumentation and data acquisition equipment are used to control the product and capture data on its performance during environmental stress in a safe and environmentally friendly manner. Design defects can be identified early, resulting in robust designs and reliable products.

FEATURES

CAPABILITIES

- Simulate extreme climatic and environmental conditions
- Develop specialized test setups
- Develop computerized analog & digital data acquisition and control

EQUIPMENT

- Salt Fog/Corrosion Chamber
- Altitude Chamber
- Data acquisition and analysis of environmental factors such as temperature, pressure, flow (liquid & gas), humidity
- Sand/Dust Chamber
- Solar Radiation/Blowing Rain Chamber
- Video test documentation
- Temperature Humidity Chambers
- Five Walk-in Temperature Humidity Chambers
- Four Mobile Trailers/Climatic Chambers
- HP3852, HP34970A, HP34980A, & Fluke Hydra data acquisition systems

REQUIREMENTS

- American Society for Testing of Materials Test Standards
- Military Standard 810F Test Standards

SHOCK, VIBRATION & ROUGH HANDLING

Edgewood Chemical Biological Center's (ECBC) Environmental and Field Testing Facilities consist of several buildings housing specialized test equipment to perform shock, vibration and rough handling tests on various military and commercial products in a safe and environmentally friendly manner. A two-building setup provides remote control capabilities that allows for a greater range of test items to include munitions such as smoke and non-lethal riot control grenades. Simulated transportation test profiles for various modes of transportation are possible and include wheeled or track vehicles, and helicopters. Test items can be subjected to various temperature and humidity conditions during vibration simulations by utilizing two piggyback environmental chambers that provide a cost effective way to expose test items to most global transportation scenarios. Packaging Tests are performed to ASTM D4169, Distribution Cycle 18. ECBC's personnel use Agilent VEE Pro© Graphical Instrumentation Programmer and Data Acquisition equipment to develop specialized test setups, capture required data, and document test results with photos and video tapes to enable identification of design defects early to ensure robust designs and reliable products.

FEATURES

CAPABILITIES

- Perform Secured Steady State or Transient Vibration in various modes including Sine, Random, Random on Random, and Sine on Random
- Perform Loose Cargo Transportation Vibration
- Perform Shock Tests - including Functional Shocks, Transit Drops, Crash Hazard, Bench Handling, and Rail Impact
- Perform Packaging Tests
- Develop specialized test setups
- Develop computerized analog & digital data acquisition and control
- Video taping for test documentation
- Temperature conditioning of test items

EQUIPMENT

- Unholtz Dickie Vibration System
- Ling Dynamics Vibration System
- Unholtz Dickie VWIN II 16 Channel Vibration Control Systems
- Loose Cargo Transportation Simulator
- 40-foot, 6-foot & 5-foot Drop Testers
- Compression Tester
- Side Impact Tester
- HP3852, HP34970A, HP34980A, & Fluke Hydra data acquisition systems with various sensors

REQUIREMENTS

- American Society for Testing of Materials Test Standards
- Military, Federal and Commercial Test Standard

Engineering Test Group

HAZARDOUS & NON-HAZARDOUS PACKAGE TESTING – ROCK ISLAND ARSENAL, ILLINOIS

The Rock Island site of the Edgewood Chemical Biological Center (ECBC-RI) testing facilities is a state-of-the-art laboratory capable of testing for a large variety of packaging concerns, for both hazardous and non-hazardous packages. The specialized test equipment performs vibration, transportation, and environmental testing on a multitude of military and commercial products. Test items can be subjected to all forms of air and surface transportation simulations and extremes to determine mission capability as well as compliance with product specifications. Specialized test set-ups capture the required data and document test results with photos, videos, as well as final test reports to confirm that designs are adequate and products are reliable. The Test Facility tests containers, components and packages to the customers' specifications such as United Nations Performance Oriented Packaging (UN POP), Title 49, ASTM, MIL STD, ISTA, ISO, FED and DOT test requirements. The Test Facility is ISO 9001-2000 Certified and operates within established procedures, work instructions, and forms.

ECBC-RI maintains a testing facility that includes chambers designed to contain chemical equipment and explosive/toxic munitions as well as environmental and field testing sites for evaluation of a product's ability to withstand acceleration, vibration, shock, temperature, humidity, rain, altitude, salt, fog, or solar radiation.

FEATURES

CAPABILITIES

- Perform High and Low Frequency Vibration Testing, Environmental Testing, and other Transportation Testing
- Verify metrology, weld certification and hardness testing
- Prototyping
- Reverse Engineering
- Pre-and Post-Production recertification inspection

EQUIPMENT

- Low Frequency Vibration Chamber
- Multi-axis Simulation Table
- High Frequency Vibration
- Environmental Rain Chamber
- Helium Leak Testing
- Incline Plane Testing
- Outgas Testing
- Package Leak Tester
- Tension Compression Tester

REQUIREMENTS

- Military, Federal, and Commercial Test Standards

PACKAGING TESTING

Edgewood Chemical Biological Center's Environmental and Field Testing Facilities perform packaging tests in accordance with (IAW) ASTM D4169. Distribution Cycle 18- "Non-Commercial Government shipments" is used extensively for military equipment to subject packaging to a sequence of anticipated hazard elements experienced during a military distribution cycle. Packages are subjected to mechanical or manual handling tests depending on package size and weight. Drop tests are conducted using 6-foot & 5-foot drop testers for manual handling and drop mechanisms attached to an A-Frame Hoist for the mechanical handling of larger items. Mechanical handling also includes tip and tipover tests, fork lift truck handling, side/lateral impacts, grabhook and sling handling conducted on the A-Frame Hoist, the side impact tester and fork lift operated on a test course. Warehouse and vehicle stacking tests are conducted on a compression tester; a transportation simulator is used for loose-load vibration. The Environmental Hazard Test is conducted in various environmental chambers and a rain chamber with temperature capabilities from 45 to 200 ° F and rainfall rates to 6 inches/hour. The Environmental and Field Test Team also performs packaging tests on first responder masks IAW standards co-developed with National Institute for Occupational Safety and Health and United Nations Performance Oriented Packaging Test on Hazardous Materials Packagings IAW ASTM D4919.

FEATURES

CAPABILITIES

- Perform Packaging Tests - including Distribution Cycle 18 Non-Commercial Government shipments
- Perform Manual & Mechanical Handling (Schedule A) Tests
- Perform Warehouse & Vehicle Stacking Tests (Schedule B & C)
- Loose & Secured Load Transportation Vibration
- Perform Shock Tests - including Functional Shocks, Transit Drops, Crash Hazard, Bench Handling, and Rail Impact
- Videotaping for test documentation
- Temperature conditioning of test items

EQUIPMENT

- A-Frame Hoist with Drop Test Release Mechanism
- Grab hooks, slings and straps
- 6-foot & 5-foot Drop Testers
- Compression Tester
- Temperature and Humidity Environmental Chambers
- Rain Chamber with Temperature Capabilities
- Loose Cargo Transportation Simulator
- Side Impact Tester
- Fork Lift

REQUIREMENTS

- American Society for Testing of Materials Test Standards
- Military Standard 810F Test Standards

Engineering Test Group

PROTECTIVE EQUIPMENT CHARCOAL TESTING

Edgewood Chemical Biological Center's (ECBC) Charcoal Testing Group of the Protective Equipment Team (PET) has been conducting charcoal testing at ECBC for over 75 years. Testing the integrity of charcoal for protective materials and filters has remained one of the primary missions of this center since the threat and use of chemical agents debuted. The testing capabilities in the Protective Equipment Team's charcoal group have been expanded and renewed with the threat of global terrorism.

Charcoal samples and filters are analyzed using a variety of analytical techniques, to include gas chromatography, infrared spectroscopy, and inductive coupled argon plasma emission spectrometer. ASZM-TEDA carbon is regularly tested against military specifications and American Society for Testing of Materials Test Standards for the acceptance of product quality, using toxic chemicals, chemical warfare agents and physical challenges. The PET works jointly with other government agencies and contractors that produce charcoal filters for the United States military to certify the production process and end item integrity.

The PET is also capable of providing filter and service life surveillance of fielded items. The group can support various Joint Service program needs and developmental programs. First article testing and canister certification are among the Charcoal Testing Group's diversified capabilities.

The PET charcoal group supports most of the nation's manufactured charcoal, protective materials and filter products for issuance to the United States (US) soldiers and civilian personnel for protection against chemical threats. The charcoal group is an active and integral part of the US military's protective equipment program and participates in performance and specification publications and standards.

FEATURES

CAPABILITIES

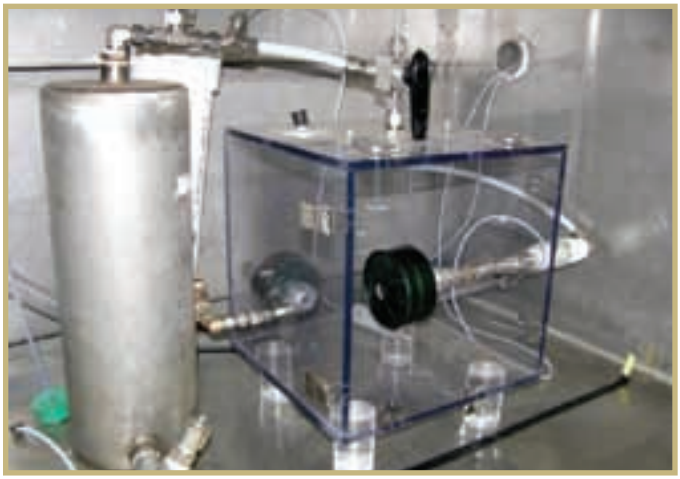
- Agent & Toxic chemical penetration testing of charcoal (canisters, filters and loose)
- Production Lot Acceptance & Military specification testing
- Certification & first article testing
- Developmental testing
- Surveillance testing of in service items

EQUIPMENT

- Gas Chromatographs
- IR Spectrometers
- ICP Spectrometers
- Agent test chambers
- Physical test apparatus

REQUIREMENTS

- ISO/IEC 17025 Accredited
- Military Certification Testing
- Review of Military Specifications



PHYSICAL PROPERTIES

Edgewood Chemical Biological Center's (ECBC) Environmental and Field Testing Facilities maintain a physical properties laboratory for the determination of various properties of test materials and products. Mask programs at ECBC come to this laboratory to determine the effects of battlefield contaminants, such as oils, fuels, decontaminants. on mask materials, including lens and straps. The lens characteristics, light transmission, haze, and distortion are measured in accordance with ASTM D1003 using hazemeters and optical testers.

The tensile compression tests on elastomers, plastics and metals are conducted with a tensile strength tester capable of performing tests with loads up to 44,000 pounds and are performed in accordance with ASTM D412 and D624. Spindle type and Ford cup type viscometers offer a variety of methods to determine viscosity of fluids. The equipment can accurately weigh test samples from .0001 grams to 2,000 pounds with a variety of scales and balances. Accurate measurements can be taken with a variety of calipers, micrometers, veneer depth and bore gauges, and gauge blocks.

FEATURES

CAPABILITIES

- Perform hardness tests on metal and plastic
- Perform tensile compression tests
- Perform hydrostatic tests - water leakage or burst tests
- Perform various optical tests - measuring light transmission, haze and lens distortion
- Determine viscosity of fluids at ambient or temperature controlled conditions
- Weigh and measure test items
- Determine effects of battlefield contaminants on test materials
- Temperature conditioning of test items

EQUIPMENT

- Instron Model 4507 Materials Tester
- Rockwell & Shore Hardness Testers
- Labline & Ford Viscometers
- Mettler & Ohaus Balances
- Gardner & Ann Arbor Optical Testers

REQUIREMENTS

- American Society for Testing of Materials Test Standards
- Military, Federal and Commercial Test Standards

Engineering Test Group

DIMENSIONAL ANALYSIS & MATERIAL TESTING

Edgewood Chemical Biological Center Test Reliability & Evaluation Team has the capability to conduct physical evaluation of a variety of products ranging from mechanical parts to filters to installation housings. This work has been performed for agencies such as the Department of Defense, National Institute of Standards & Technology, and Occupational Safety & Health Administration.

The dimensional analysis area has a vast array of optical and physical equipment for making and/or verifying dimensional measurements through first article testing, acceptance, production, surveillance, and developmental efforts. Some of the equipment includes: the J&L™ Optical Comparators, which measure contours, silhouettes, surfaces, angles, and radii; the Nikon™ Measuring Microscope, which is capable of measuring in the x, y, and z vectors; and the Profilometer, which gauges the quality of a surface.

Another aspect of physical evaluation is material testing. Examples of tests include tensile, compression, Rockwell hardness, and micro hardness. These tests are useful to customers who wish to quantify the strength characteristics of plastic and metal samples.

FEATURES

CAPABILITIES

- Physical Evaluation & Measurement:
  - Dimensional Analysis
  - Durometer Evaluation
- Material Testing:
  - Tensile
  - Compression
  - Hardness
  - Micro Hardness
  - Others

EQUIPMENT

- J&L™ Optical Comparator
- 4'x8' Granite Surface Plate (Grade A)
- Trimos™ Height Gauge
- Nikon™ Measuring Microscope & Secondary Nikon™ Stereo Viewing Scope
- Rockwell Hardness Tester & Micro Hardness Tester
- Rubber Compression Testing
- Coordinate Measuring Machine
- Profilometer
- Paper Micrometer
- Material Polishing Station
- Instron™ Tensile Test (2 pounds to 11,000 pounds)
- Brittle Test
- Abrasion Test
- Elrrendorf Tear Test
- Hydrostatic Test
- Large selection of hand-held instruments for a variety of applications

REQUIREMENTS

- Federal Standards
- American Society for Testing of Materials Test Standards
- Military Standards
- Custom Requests

GAS CHROMATOGRAPH LABORATORY

The Test, Reliability & Evaluation Team provides a variety of Chemical, Biological, Radiological, and Nuclear (CBRN) defense services through the use of test chambers and analysis methods in the Gas Chromatograph (GC) Laboratory. Through the use of the chemical simulant Methyl Salicylate (MeS), we are able to test equipment as if it were exposed to a chemical event. Three separate test chambers and a clean room are utilized to test a variety of items ranging from suits to filters to equipment and clothing.

FEATURES

CAPABILITIES

- **Analyze MeS concentrations in tubes or PSDs as low as 1ng.**
- **Analyze GC lab results to determine protection offered by CBRN equipment and suits.**

EQUIPMENT

- **Sorbent Sampling Tubes**
- **Stainless steel tube (90mm long by 6.35mm outside diameter)**
- **Tenax TA 60/80 adsorbent**
- **(2) Perkin Elmer Automatic Thermal Desorption Systems (ATD 400s)**
- **50 sample autosampler**
- **Temperature programmable**
- **Three sample analysis methods**
- **(2) Perkin Elmer Autosystem Gas Chromatographs**
- **Zebron ZB-1 30m L x 0.25mm ID x 1.00µmdf capillary column**
- **Flame Ionization Detector**
- **Integration Software**
- **Perkin Elmer's TotalChrom software**
- **Auxiliary Equipment**
- **Nitrogen, Hydrogen and Zero Air Generators**

Our collection methods use sample sorbent tubes or Passive Sampling Devices (PSDs) packed with Tenax TA 60/80. These PSDs are exposed to the environment, evaluated and subsequently analyzed in our state-of-the-art laboratory.

Our laboratory uses thermal desorption to extract the volatiles (MeS) from the non-volatile matrix (Tenax TA 60/80) by heating the sample in a stream of inert gas. The volatiles are then swept in a stream of inert gas to a gas chromatograph for analysis. The gas chromatographs are equipped with flame ionization detectors to determine the amount of volatiles collected. An electrical signal is generated from the ionization of the samples as it is converted into a mass. This mass allows us to determine the amount of simulant the equipment was exposed to.

Engineering Test Group

SAMPLE PROCESSING AREA

The Sample Processing Area (SPA) is a chemical warfare agent analytical surety laboratory. The SPA personnel are continually broadening their capabilities to meet the demands and challenges of new and changing missions. Analytical laboratory procedures include the use of the following: Gas Chromatograph (GC), Mass Selective Detector (MSD), Dual Flame Photometric Detectors (DFPD), Automatic Continuous Environmental Monitoring (ACEM), and many wet chemistry techniques. These procedures analyze water, soil and solids, swipes, decontamination solutions, and air. A Depot Area Air Monitoring System is used for the analysis of solid sorbent tubes.

The personnel of the SPA have implemented a Quality Control Plan that contains all the requirements outlined within the chemical agent handling standards. Dedicated personnel manage the SPA to support both the toxic and explosive chamber tests and small stand alone tests within a fume hood. The laboratory is capable of performing handling and analysis of chemical surety and non-surety agents.

A large facility access door, operations control room, the availability of hydraulic scissor lift and adequate working space surrounding the chamber, provide for ease of operations and necessary infrastructure alterations.

FEATURES

CAPABILITIES

- Supports chemical surety agents and non-surety agent analysis
- Rapid screening of chemical compounds
- Quality Control procedures and systems

EQUIPMENT

- Thermal Desorption System
- GC
- DFPD
- ACEM
- MSD
- Carbon and High Efficiency Particulate Air filtered fume hoods

TRACE-LEVEL ANALYSES IN COMPLEX MATRICES

The Special Projects Group of the Applied Test Team is ISO 17025 accredited to perform trace analyses in complex matrices. Analytes include chemical agents and toxic industrial compounds. We have performed trace-level analyses in caustic process residue samples, landfill leachate samples, fuel oil, gas bag samples, and soil samples. A team of chemists, engineers and technicians, with over 20 years experience, routinely work with clients to develop and implement testing requirements for effective and efficient project execution. Project planning includes identifying and mitigating technical, schedule and cost risk elements early in the project. Whenever possible, test requirements are based upon or extrapolated from existing program requirements when applicable. This is prudent to foster defensibility and acceptance of project data that has unprecedented test requirements. Analytical equipment is capable of measuring compounds of interest to picogram levels with a variety of detectors. Robust sampling, sample clean-up, extraction, and analytical protocols minimize sample matrix effects and result in accurate, precise and defensible data.

FEATURES

CAPABILITIES

- ISO 17025 accredited for performing trace level analyses in complex matrices
- Develop and optime sampling and analytical methods
- Perform near real-time and off-line analyses under challenging test conditions

EQUIPMENT

- Research-grade Varian gas chromatograph with four detectors
- Gas Chromatographs, Mass Spectrometers, Liquid Chromatograph and Ion Chromatograph
- Thirteen surety hoods
- Two gloveboxes

Engineering Test Group

QUANTITATIVE PERMEATION TESTING

Edgewood Chemical Biological Center's Special Projects Group of the Applied Test Team is ISO 17025 accredited to perform permeation testing for chemical agents over a wide range of environmental conditions. With over 20 years experience, routine operational and developmental testing of commercial, military and novel protective materials is conducted. Operational testing is conducted in accordance with the TOP 8-2-501and MIL-STD-282. Developmental testing includes more rigorous sensitivity limits, longer aspiration times, and elevated temperature and humidity. Near real-time detection of chemical agents is accomplished with a MINICAMS or a gas chromatographic (GC) system. This unique capability minimizes agent carryover within the 12-port permeation manifold and the analytical system. The GC not only detects chemical agents in an accurate and precise manner, but also automatically generates spreadsheet reports for easy archival and transmission to off-site customers. Temperature and humidity plots are monitored on the second scale with a computer and archived as part of the project's data package.

FEATURES

CAPABILITIES

- ISO 17025 accredited for performing permeation testing
- Routinely conduct permeation testing per TOPs 8-2-501 and MIL-STD 282
- Development of novel methods to meet future and more stringent operational testing requirements
- Design unique permeation test hardware
- Perform near real-time and off-line analyses under challenging test conditions

EQUIPMENT

- Two 12-port permeation manifolds
- Gas chromatographs
- MINICAMS®
- Twelve surety hoods

PROTECTIVE EQUIPMENT PERMEATION TESTING

Edgewood Chemical Biological Center's Permeation Testing Group of the Protective Equipment Team conducts first article and production acceptance testing of chemically protective permeable and impermeable materials. The group also supports the Joint Service General Purpose Mask/Joint Service Aircrew Mask development programs by testing swatches according to the National Institute for Occupational Safety and Health (NIOSH) and Technical Support Working Group testing and acceptance criteria. Samples submitted are tested with adherence to standard methods, primarily military specifications as defined in Test Operating Procedures, American Society for Testing of Materials Test Standards and military standards (i.e. MIL-STD-282).

The protective materials used for testing are sampled from: butyl cloth, butyl gloves, footwear, hoses, lenses, rubber slabs, gas-mask components, coveralls, ITAP* suits and chemical resistant materials and liners.

*Improved Toxicological Agent Protective

FEATURES

CAPABILITIES

- Agent vapor and liquid challenge testing of chemically protective materials
- Qualitative and quantitative testing
- First article and acceptance testing

EQUIPMENT

- MINICAMS®
- Q170 Congo Red Indicator
- Q171 System
- TOPs Cups
- Dawson Cups

REQUIREMENTS

- NIOSH/Center for Disease Control Certification Testing
- Military Standards and Specifications
- ISO/IEC 17025 Accredited

Engineering Test Group

MASK-SYSTEM AGENT TESTING

Army Edgewood Chemical Biological Center's Mask Testing Group of the Protective Equipment Team (PET) conducts system agent testing on complete mask systems utilizing the Simulant Agent Resistant Test Manikin (SMARTMAN) Headform. We test Air Purifying Respirators, Self-Contained Breathing Apparatus, Powered Air Purifying Respirators and Escape Hoods as well as Joint Service General Purpose Masks and Joint Service Aircrew Mask Programs. PET works closely with customers to design and validate the certifications tests and finalize the standard test protocol. PET conducts the certification tests for the National Institute for Occupational Safety and Health (NIOSH). We conduct NIOSH certification on commercial mask systems.

The PET is able to simulate human breathing under a variety of environmental conditions, such as heat and humidity, at a variety of breathing rates.

The PET certifies foreign and domestic mask systems to US standards.

FEATURES

CAPABILITIES

- Agent testing on complete mask systems
- Vapor and liquid challenge testing
- First article performance testing

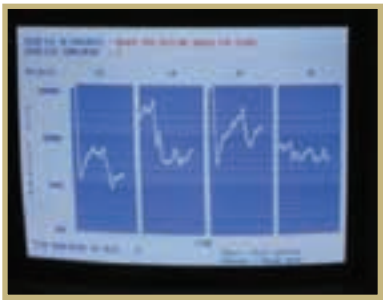
EQUIPMENT

- MINICAMS®
- Photoacoustic
- SMARTMAN Headform
- MIRAN®
- Hy-Fed

REQUIREMENTS

- NIOSH/CDC Certification Testing
- Homeland Security Certification Testing
- NIST Certification Testing
- ISO/IEC 17025 Accredited

PROTECTION FACTOR TEST FACILITY – RESPIRATOR & ENSEMBLE FIT



Edgewood Chemical Biological Center's (ECBC) Protection Factor Testing Facility is designed to evaluate chemical protective capabilities of respirator systems such as masks and protective clothing. In order to simulate exposure to chemical agents, volunteers don test items and enter a test chamber containing a polydispersed corn oil aerosol challenge. The corn oil aerosol is between 0.4 and 0.6 micron in diameter and has an air concentration of 20-40 mg/m3. The air inside the protective equipment is sampled for challenge aerosol particles while the subject undergoes of series of exercises intended to evaluate worst-case operational conditions. The human performance testing is conducted to ensure comfort, fit, breathing resistance, vision, and communication aptitude. There is a standard set of exercises or the customer may specify exercises pending approval by the Human Use Committee. Sampling is accomplished through a length of silicon tubing that is connected from the mask and/or suit to the laser photometers. The results are graphically displayed real-time on a computer monitor. The facility comprises an entrance airlock and aerosol exposure chamber that can accommodate up to sixteen volunteers and is designed for flexible protocol setup. Active vapor testing is used if additional testing is needed. Vapor testing, like aerosol testing provides real-time active sampling. Methyl Salicylate is the primary substance used for vapor testing.

FEATURES

CAPABILITIES

- Protection Factor / Fit Factor testing with corn oil aerosol
- Vapor Challenge Testing with Methyl Salicylate (MeS)
- User Performance Testing (evaluations, obstacle courses)

EQUIPMENT

- 10' x 16' x 32' corn oil aerosol chamber
- Laser Photometers
- M41 PortaCounts
- Environmental Fogging Chamber

REQUIREMENTS

- National Institute of Occupational Safety and Health Chemical, Biological, Radiological and Nuclear Certification Testing
- Joint Service Standardization Agreement for Fit Factor Testing

MAN IN SIMULANT TESTING (MIST)

The MIST is the preferred method of determining the overall Protection Factor (PF) of Chemical, Biological, Radiological and Nuclear protection equipment to be used for protection against chemical warfare agents (CWA). The results of this testing are used with the Body Region Hazard Analysis (BRHA) to determine the overall PF of the suit. This method uses actual skin adsorption data on agents and simulants to predict the Medium Required Exposure Dosage (MRED) an individual must be exposed to while wearing the suit in order to produce end-point reactions in the body for systemic (nerve agent) and localized (mustard) exposure to agents.

MIST is performed by:

- Dressing test participants up in a protective suit ensemble with passive sampling devices (PSDs) placed on the skin;
- Exposing the test participant to a high concentration of a non-toxic CWA simulant while performing routine exercise movements;
- Removing and analyzing the PSDs for simulant vapor that was adsorbed at the skin;
- Analyzing the PSD data with the BRHA to determine performance characteristics of the suit ensemble.
- Obtaining data through analysis at the laboratory.

FEATURES

CAPABILITIES

- **Determine the overall protection factor of a suit ensemble.**
- **Calculate the MRED for nerve and blister agents.**

EQUIPMENT

- **Test Chamber**
- **40’ L x 20’ W x 14’ H**
- **Temperature controlled**
- **Four ¼ horsepower industrial fans**
- **Clean Room**
- **Five-stage clean room with overpressure**
- **600 cfm fan filter assembly to create overpressure**
- **Challenge Generator**
- **Hot-air vapor generator blower system**
- **MIRAN®**

MASK & MASK FILTER PERFORMANCE

Edgewood Chemical Biological Center maintains a respiratory mask and filter testing laboratory that performs a range of product qualification tests. These tests include filter gas life, particulate efficiency, mask leakage and resistance, and dimensional inspections related to craftsmanship.

The team performs work for commercial and government customers. Common test items include the C2A1 canister and the M40 Army field mask. Other government products recently tested include the Joint Service Aircrew Mask, Joint Service Chemical Environment Survivability Mask, and Joint Service General Purpose Mask.

The laboratory also has the capability to expose masks, filters, and materials to adverse environmental conditions such as hot and cold temperatures, accelerated aging, and ozone to determine the durability of products.

FEATURES

CAPABILITIES

- Filter Life
- Dimethymethylphosphonate Gas Life
- Filter Efficiency
- Particulate Penetration (Simulants used include Polyalphaolephin and mineral oil)
- Mask Leakage
- Dimensional Inspection of Craftsmanship
- Environmental & Mechanical Tests

EQUIPMENT

- Filter Efficiency
- TDA 100P
- Q127 Penetration Tester
- Mask Leakage
- M14 Mask Leakage Tester
- TDA99M Mask Field Tester
- Q213 Inhalation & Exhalation Resistance Tester
- Q179 Drink Tube Resistance Tester
- Q204 Drink Tube Bubble Tester
- M14 Outlet Valve Tester
- TDA124 Outlet Valve Tester
- M4A1 Outlet Valve Tester

REQUIREMENTS

- MIL-PRF-51560C
- National Institute for Occupational Safety and Health Standards
- Custom Test Plans and Specifications

Engineering Test Group

GAS & HIGH EFFICIENCY PARTICULATE AIR(HEPA) FILTER TESTING PERFORMANCE

Gas filters are destructively evaluated for nerve agent and mustard life using the simulant dimethylmethylphosphonate (DMMP) as a challenge. Filters are tested according to the test plan and are accepted or rejected based upon test results. The use of DMMP simulant allows for expanded testing with little risk and at a fraction of the cost associated with agent testing. Gas filter DMMP life values can be correlated to agent life.

HEPA filters are nondestructively evaluated for aerosol efficiency by challenging with a 0.3 micrometer polyalphaolfin (PAO) aerosol, Durasyn 164. Upstream and downstream particles are laser sized and counted to determine filter efficiency. This is a nondestructive test therefore 100% inspection is possible. The High Flow Alternative Test System capable of measuring particle size as small as 0.10 micrometers is utilized for this testing. The durability and design performance of the HEPA and gas filter in rough terrain can be determined by the rough handler test and environmental test.

FEATURES

SYSTEM & TEST REQUIREMENTS

- Evaluate gas filters against DMMP
- Conduct rough handling tests
- Conduct environmental testing

EQUIPMENT

- Q262 and Q223 Filter Life Testers
- Rough Handler
- HFATS
- PAO Aerosol Generators/Detectors
- LMP2000

REQUIREMENTS

- ASME N510
- MIL-STD Requirements
- ASME AG-1 Requirements

FILTERS TESTED

- M12, M14, M48A1, M98 filter set, M98 HSFC, M49 gas filter
- Commercial & DOE HEPA filters
- Type II 400CFM gas filters
- Homeland Defense, COE gas and HEPA filters
- V-Cell gas filters
- TACOM 200CFM Tank filters
- Gas mask filters

QUALITY PRODUCT LIST (QPL) FOR HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTERS & MEDIA

The qualification tests are unique tests conducted by Edgewood Chemical Biological Center (ECBC). Testing of HEPA media (paper) and HEPA filters are performed in accordance with the American Society of Mechanical Engineers (ASME) AG-1 code and DOD/DOE specifications. Products that meet these qualification tests are added to the QPL database which is maintained at ECBC and contains a listing for both HEPA media and HEPA filters.

FEATURES

REQUIREMENTS

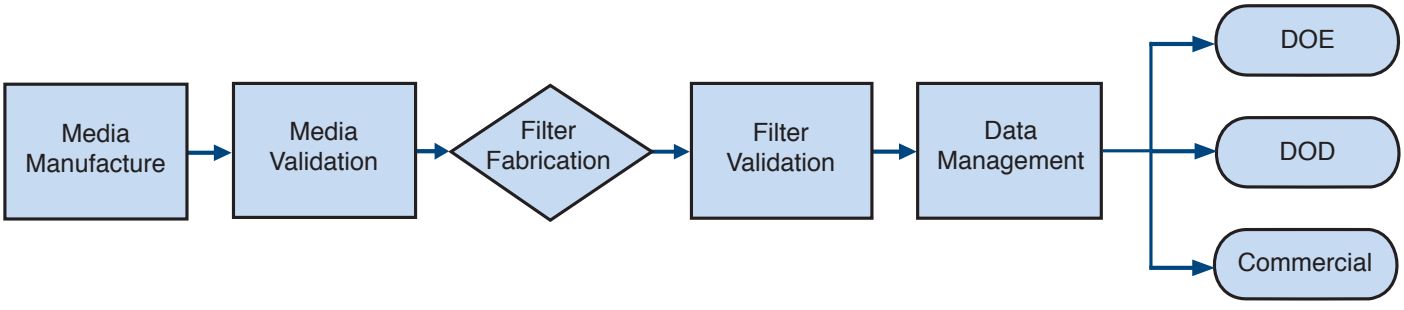
- Qualification testing of HEPA filters and HEPA Media
- Testing conducted in accordance with ASME AG-1 (replaces MIL-STD 51068 and MILL-STD 51079)
- MIL-STD 810F
- Maintain QPL Database

REQUIPMENT

- Instron Tensile Tester
- TDA 100P Penetrometer
- Q101 Water Repellency
- Q110 Rough Handler
- HFATS Penetrometer
- Q160 Over Pressure Tester

HEPA MEDIA & FILTERS

- Airflow Resistance
- Aerosol Penetration
- Tensile Strength and Elongation
- Wet Tensile Strength
- Gamma Irradiation
- Water Repellency
- Flexing Characteristics
- Acidity
- Thickness
- Combustible Material
- Rough Handling
- Over Pressure
- Fungus Test (Optional)



Engineering Test Group

QUALITY ASSURANCE TESTING & FIRST ARTICLE TESTING – ROCK ISLAND ARSENAL, ILLINOIS

Edgewood Chemical Biological Center—Rock Island Site (ECBC-RI) Quality Assurance (QA) First Article Test (FAT) Laboratory contains an array of precise equipment to perform a large variety of FAT and QA testing. The laboratory provides testing to life cycle support agencies and to Integrated product teams. Additionally, the ECBC-RI laboratory performs production lot acceptance tests and documents results per the customer's needs. Performing detailed and precise FATs in support of military and commercial customers is a primary function of the laboratory. The QA and FAT Laboratory is ISO 9001-2000 certified and operates with precise procedures, work instructions, and forms. Tests conducted capture requested data that detail the testing procedures and allow the customer to identify design defects to ensure successful designs and dependable products.

FEATURES

CAPABILITIES

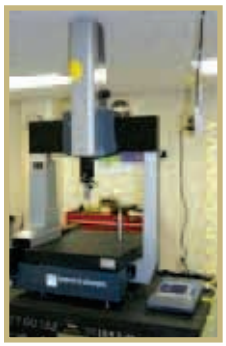
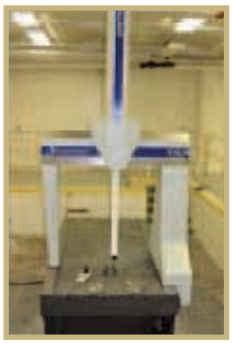
- Perform First Article Tests on a large variety of military and commercial equipment
- Provide accurate Production Inspections

EQUIPMENT

- Small Coordinate Measuring Machine
- Large Coordinate Measuring Machine
- Profilemeter
- Optical Comparator
- Rockwell Harness
- Hot Chamber for Long Term Storage
- Cold Chamber for Long Term Storage
- X-Ray Tube and Control Module
- Ultrasonic Thickness Gauge
- Ultrasonic Flaw Detector
- Magnetic Particle Tester

REQUIREMENTS

- Military, Federal, and Commercial Test Standards



STATIC VAPOR SIMULANT TEST CHAMBERS

The Test, Reliability and Evaluation Team operates two static challenge test chambers. The chambers provide a controlled environment for static challenge, entry/exit, and pressurization testing of Chemical, Biological, Radiological, and Nuclear (CBRN) protection equipment. The Static Challenge Test Chamber has a long history of use for full Collective Protection testing of tracked and wheeled vehicles, hard and soft walled shelters, and even field deployable environmental control units.

Equipped with industrial strength mixing fans, the 40'L x 20'W x 14'H chamber uses a hot air vapor generator to produce a Methyl Salicylate (MeS) vapor concentration of up to 100 mg/m3 or a Sulfur Hexa-flouride vapor. A MIRAN® in conjunction with a concentration controller and a Data Acquisition System are used to automatically monitor, maintain and record test parameters/data. Air sampling is performed with MINICAMS® and sorbent sampling tubes filled with Tenax TA.

The Large Scale Static Challenge Test Chamber was constructed for testing of larger CBRN equipped systems. The chamber will be outfitted with a data acquisition system, vapor generator, MINICAMS®, and instrumentation.

The Low Dosage Test Chamber is 16'L x 12'W x 9'H and contains oscillating fans that provide thorough mixing and circulation of both air and the chemical simulant MeS. A hot-plate vapor generator may be used to produce either a single dose vapor challenge of up to 5 mg/m3 or the electric metered syringe pump may be used to maintain a continuous MeS vapor challenge concentration of 1 – 5 mg/m3. Air sampling is performed with MINICAMS® and sorbent sampling tubes filled with Tenax TA.

FEATURES

CAPABILITIES

- Simulant Concentration: 1 – 100 mg/m3
- Chamber Pressure: 0 – (-0.5) inches water gauge (iwg)
- Air Flow: 0 – 5000 CFM
- 40' L x 20' W x 14' H Chamber
- Temperature controlled

LARGE SCALE CAPABILITIES

- Simulant Concentration: 1-100 mg/m3
- Large footprint of 1500 ft2.
- 48'L x 32'W x 16'H

SMALL SCALE CAPABILITIES

- Simulant Concentration: 1 – 5 mg/m3
- Chamber Pressure: (-0.5) - 1 iwg
- 16' L x 12' W x 9' H Chamber

AIR SAMPLERS

- Stainless steel sorbent sampling tubes
- Vacuum pump with inline critical orifice
- Electric actuated sequencer
- MINICAMS®

CHALLENGE GENERATOR

- Hot-plate vapor generator
- Hot-air vapor generator blower system
- Foxboro miniature infra-red gas analyzer (MIRAN®)

Engineering Test Group

FIXED SITE & FILTER-IN-PLACE SYSTEMS PERFORMANCE

FIXED SITE

Edgewood Chemical Biological Center (ECBC) has the ability to design Chemical, Biological, Radiological and Nuclear (CBRN) filtration systems for fixed sites, operation buildings overseas, vehicular platforms, and facilities including military dorms and chemistry labs. From systems initial design and development to systems sustainment, ECBC offers a "cradle to grave" solution for the armed forces against CBRN attacks. Systems sustainment includes development of system/design requirement, Standard Operating Procedures and protocols, process validation, in-place certification testing, and filter monitoring for CBRN filtration systems.

In-place certification testing of installed CBRN filters for government laboratories, vehicles, and fixed sites both home and abroad can be performed. This testing certifies that the entire filtration system is capable of protecting against a CBRN attack. These systems are evaluated in accordance with the American Society of Mechanical Engineers N510 procedures for mechanical leaks using portable polydispersed polyalphaolfin aerosol generators/detectors and nondestructive gas simulants (non-Ozone depleting fluorocarbons) and electron capture chromatographic detection methods. The in-place leak test is a leak test and not a life test and is required to evaluate the CBRN filtration system for proper filter installation, and carbon/particulate damage.

MOBILE LABORATORY

FEATURES

CAPABILITIES

- Requirements Development
- Prototype Design Concepts
- Design and Integration
- Production and Installation
- Develop Test Protocols and Standard Operating Procedures
- CBRN System Test
- Perform in place testing of complete filtration systems
- Facility/System Certification Tests
- Airlock Test
- Design & Drawing Review

EQUIPMENT

- Aerosol Generators
- Aerosol Detectors
- LMP2000 Tracer Gas Monitor
- CAD / SolidWorks

REQUIREMENTS

- ASME N510
- ASME AG-1 Requirements
- DOE-STD-3020-97 Requirements

FACILITY DESIGN

SHIPBOARD

CP MOBILE SYSTEMS

FULL SYSTEM COLLECTIVE PROTECTION TESTING

Full system collective protection testing is performed at the Test, Reliability and Evaluation Team's test facility located at Edgewood Chemical Biological Center. This facility is used to perform full system tests including: static challenge, purge, leakage, pressurization, and entry/exit testing on collective protection equipment.

Throughout the development cycle, shelters, vehicles, and heating, ventilation, and air conditioning systems must meet several test requirements.

Static challenge, entry/exit, and pressurization testing is performed in either of the Static Challenge Test Chambers. Once an item is set up in the chamber a pressurization test is performed to ensure the shelter maintains proper overpressure. The item would then be exposed to three static challenge trials to determine its protection factor. Finally, an entry/exit test would be performed to determine the maximum number of people that could be processed into a shelter or vehicle within an hour.

Purge testing is performed to determine how long it takes for an airlock, shelter, or vehicle to clear itself of a particulate cloud. The ATI Aerosol Generator TDA-4B uses Emory oil and compressed air to create a particulate cloud within the interior of an airlock, shelter, or vehicle. The ATI Particulate Detector TDA-2EL provides real time monitoring of the system's concentration levels while recording purge log reduction levels.

Leakage testing of a vehicle or shelter is performed to identify and correct possible leakage points. The Improved Mobile Airflow Tester (IMAT) is used to isolate and quantify airflow leakage rates at various system operating pressures on vehicles, and shelters. The IMAT operates at 0-3000 cubic feet per minute and 0-5 inches water gauge.

FEATURES

CAPABILITIES

- Static Challenge Testing
- Entry/Exit Testing
- Pressurization Testing
- Purge Testing
- Leakage Testing

EQUIPMENT

- Static Challenge Test Chamber
- Large Scale Static Challenge Test Chamber
- ATI Aerosol Generator TDA-4B
- ATI Particulate Detector TDA-2EL
- IMAT

Engineering Test Group

DETECTOR EVALUATION

Edgewood Chemical Biological Center's (ECBC) Detector Group of the Applied Test Team (ATT) is ISO 17025 accredited to perform detector evaluations for chemical agents and toxic industrial compounds over a wide range of environmental conditions. The Detector Group is certified to perform operational testing of M256A1, M18 and M34 detector kits by ECBC Rock Island Arsenal.

The ATT has over 20 years experience performing operational and developmental testing of commercial off-the-shelf and prototype detector systems. The Detector Group is the lead laboratory for supporting national chemical defense programs such as Domestic Preparedness, Joint Service Operational Requirements, US Customs, Department of Justice, and first responder requirements. Routine tests are performed on portable and lab-based detector systems capable of ultra-trace and high level detection of chemical agents and toxic industrial compounds.

This work is accomplished with a team of scientists, engineers and technicians who are focused on mission completion and customer satisfaction. Gas chromatographs and MINICAMS® are used to monitor the vapor from a patented generation system as part of detector testing. Detector evaluations are conducted in surety hoods under ambient conditions or elevated humidity, as well as in 100-ft^3 environmental chambers. These three chambers also permit the use of toxic interferents with and without chemical agent challenges. This unique feature is valuable for simulating field operational conditions.

During developmental testing, customers routinely witness testing and provide real-time guidance for any adjustments to detector settings and test conditions. All data is captured in electronic data sheets for efficient data archival and security, and routine transmission to off-site customers. The ultimate goal to our customers is to accomplish all work in an effective and efficient manner and provide technically defensible detector data.

FEATURES

CAPABILITIES

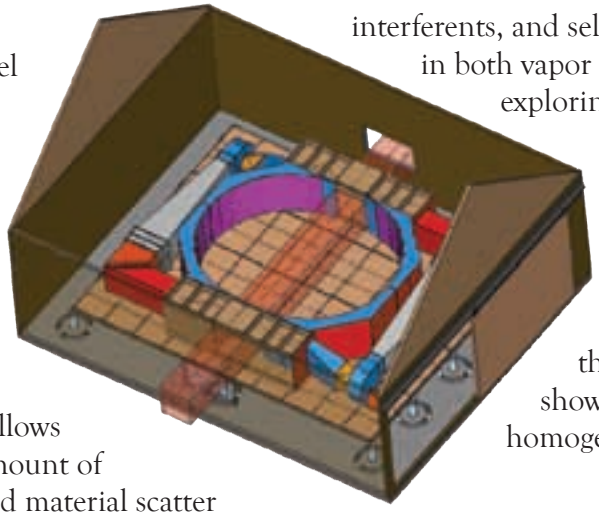
- ISO 17025 accredited for evaluating detectors
- Effective in troubleshooting detector systems
- Generate innovative instrument designs

EQUIPMENT

- Gas Chromatographs
- MINICAMS®
- Patented vapor generation system
- Three 100-ft^3 environmental chambers
- Sixteen surety hoods
- Three gloveboxes

VORTEX CHAMBER

Edgewood Chemical Biological Center (ECBC) is home to a novel standoff detection technology evaluation facility that for the first time ever, allows precise performance measurement of standoff detection systems at significant distances.



The only one of its kind in the country, this windowless facility, known as the Vortex Chamber, allows researchers to release a known amount of material and maintain a calibrated material scatter so that a standoff detector's ability to "see" can be accurately measured from up to several kilometers away. This increased precision reduces uncertainty about the potential field performance of standoff detectors.

The Vortex Chamber was designed for use in the Artemis chemical standoff detection program to allow aerosol backscatter and vapor measurements with a frequency-agile carbon dioxide (CO2) Light Detection and Ranging (LIDAR) standoff detector. The chamber utilizes curtains of air, produced by an interior vortex balanced by an exterior counter flow of air, to contain the material cloud, preventing the backscatter off of conventional hard windows from corrupting the desired measurements on the cloud inside the chamber. The prevention of backscatter is critical because the CO2 LIDAR has a long (1 microsecond) pulse and the backscatter off the window cannot be temporarily separated from the backscatter off of an aerosol in the chamber.

With known and modest modifications, this ECBC asset can be used with all passive and active, chemical and biological, standoff technologies and systems at any stage of development. The chamber was designed for testing with a variety of CB simulants, interferents, and selected toxic industrial chemicals in both vapor and aerosol form. ECBC is exploring the regulatory acceptability of extending the operations to include "kill" pathogens, which if permitted would produce a tremendous benefit for the CBDP. Using state-of-the-art ground truth instrumentation, the Vortex Chamber has been shown to successfully contain a homogeneous aerosol cloud.

FEATURES

CAPABILITIES

- Homogeneous Suspension of aerosols for up to 15 min.
- Generate wet or dry aerosols up to 200 micrometers in diameter
- Chamber operated in a closed or open window configuration
- Chamber cleared of aerosols in minutes
- Ground Truth Nephelometer Data
- Homogeneous aerosol distribution, long time constants
- Able to be upgraded to BL-2

EQUIPMENT

- 4-foot X 4-foot aperture
- 20-foot path length
- Stainless Steel Lining
- Windowless Vortex Chamber with volume of 2365 cubic feet
- Air Curtain Technology
- 2 Aerodynamic Particle Sizers (0.5-20 mm, 50 bins)
- Isokinetic sampling

HOW TO OBTAIN ETG SERVICES

The ETG provides testing services for Department of Defense, other Federal agencies, foreign governments, as well for the private sector. The process for obtaining the services of the ETG consists of the development of a scope of testing to be performed, and the associated costs and schedule, agreeable to all parties. The agreement of cost, schedule and performance is formalize in various manners generally in accordance to the customer organizational affiliation as follows:

- Department of Defense (DoD). Agreements with other DoD elements can be satisfied by a Military Interdepartmental Purchase Request (MIPR), DD FORM 448, Jun 72.
- Federal Agencies. Other federal agencies agreement vehicles may be in the form of Interagency Agreement (IAA), Memorandum of Agreement (MOA), or similar mechanism.
- Private Sector.
  - The Test Services Agreement (TSA) is the method for the private sector to obtain ETG services. A straight-forward and standardized approach the TSA granted by statutory authority 10 U.S.C. Sec. 2539b; Availability of Samples, Drawings, Information, Equipment, Materials, and Certain Services. More information concerning the TSA process can be found at www.ecbc.army.mil. See TOP ECBC LINKS > Working with ECBC > Test Services Agreement > TSA Handbook. Any questions regarding TSAs should be addressed to the ECBC Technology Transfer Office at 410-436-4438/2031. Inquiries can also be sent by E-mail to technical.outreach@apgea.army.mil.
  - A Cooperative Research and Development Agreement (CRADA) provides the mechanism for test services is a means for private industry to collaborate with Army research and development activities. Parties to a CRADA may exchange intellectual property, expertise and data or they may hire personnel or rent services or materials, equipment and facilities. Federal agencies can accept funding under a CRADA to perform research or development of benefit to the CRADA partner. More information concerning the CRADA process can be found at www.ecbc.army.mil. See TOP ECBC LINKS > Working with ECBC > Cooperative Research and Development Agreement. Any questions regarding CRADAs should be addressed to the ECBC Technology Transfer Office at 410-436-4438/2031.

Inquiries can also be sent by E-mail to technical.outreach@apgea.army.mil.

POINTS OF CONTACT

ENGINEERING TEST GROUP
ENGINEERING DIRECTORATE, ECBC

ENGINEERING TEST GROUP

Ronald P. Pojunas, P.E., Leader
Voice: (410) 436-5596
ronald.pojunas@us.army.mil

Genna Buckless, Business Manager
Voice: (410) 436-9788
genna.buckless@us.army.mil

TEST, RELIABILITY & EVALUATION TEAM

Do Nguyen, Leader
Voice: (410) 436-4237
do.nguyen@us.army.mil

Derek Mancinho, Senior Engineer
Voice: (410) 436-5990
derek.mancinho@us.army.mil

ENVIRONMENTAL & FIELD TESTING TEAM

Chris Myers, Leader
Voice: (410) 436-3508
christopher.d.myers@us.army.mil

PROTECTION FACTOR/ HAZARDOUS MATERIEL TESTING

Alex Pappas, Facilities Team Leader
Voice: (410) 436-3338
alex.pappas@us.army.mil

APPLIED TEST TEAM

Mike Gooden, Leader
Voice: (410) 436-2801
michael.gooden@us.army.mil

PROTECTIVE EQUIPMENT TEAM

Mary Drummond, Leader
Voice: (410) 436-4796
mary.drummond@us.army.mil

ECBC, ROCK ISLAND ARSENAL, IL

Nannette (Nan) M. Ramsey
Acting Site Manager
Voice: (309) 782-5632
nan.ramsey@us.army.mil

For more information about the Engineering Test Group at Edgewood Chemical Biological Center, visit our web site at: **www.ecbc.army.mil**, part of the U.S. Army Research, Development and Engineering Command.

EDGEWOOD
CHEMICAL BIOLOGICAL CENTER
A US Army RDECOM Laboratory

MARCH 2007

Approved for Public Release